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1: Lancet. 1999 Jun 5;353(9168):1930-3.

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FULL-TEXT ARTICLE

Volatile organic compounds in breath as markers of lung cancer: a cross-sectional study.

Phillips M, Gleeson K, Hughes JM, Greenberg J, Cataneo RN, Baker L, McVay WP.

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BACKGROUND: Many volatile organic compounds (VOCs), principally alkanes and benzene derivatives, have been identified in breath from patients with lung cancer. We investigated whether a combination of VOCs could identify such patients. METHODS: We collected breath samples from 108 patients with an abnormal chest radiograph who were scheduled for bronchoscopy. The samples were collected with a portable apparatus, then assayed by gas chromatography and mass spectroscopy. The alveolar gradient of each breath VOC, the difference between the amount in breath and in air, was calculated. Forward stepwise discriminant analysis was used to identify VOCs that discriminated between patients with and without lung cancer. FINDINGS: Lung cancer was confirmed histologically in 60 patients. A combination of 22 breath VOCs, predominantly alkanes, alkane derivatives, and benzene derivatives, discriminated between patients with and without lung cancer, regardless of stage (all $p<0.0003$). For stage 1 lung cancer, the 22 VOCs had 100% sensitivity and 81.3% specificity. Cross-validation of the combination correctly predicted the diagnosis in 71.7% patients with lung cancer and 66.7% of those without lung cancer. INTERPRETATION: In patients with an abnormal chest radiograph, a combination of 22 VOCs in breath samples distinguished between patients with and without lung cancer. Prospective studies are needed to confirm the usefulness of breath VOCs for detecting lung cancer in the general population.

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